



## Low Power-Loss Voltage Regulators

### TO-220 type

(Ta = 25°C)

Model No.	Features	Absolute maximum ratings				Electrical characteristics			Built-in functions						Package					
		Output current I <sub>o</sub> (A)	Input voltage V <sub>in</sub> (V)	Power dissipation (W)		Output voltage V <sub>o</sub> *3 (V) TYP.	Output voltage precision (%)	Dropout voltage V <sub>I-O</sub> *5 (V)	Overheat protection	Overcurrent protection	ON/OFF control	Low dissipation current at OFF state	Variable output voltage	Lead forming available		Package shape type*7				
				Pd*1	Pd*2															
PQxxRD08J00H series	ASO protection function	0.8	20	1.25	10	5, 9, 12	±3	0.5	○	○	○					A				
PQ3RD083J00H						3.3			○	○	○					A				
PQ6RD083J00H						6.3			○	○	○					A				
PQxxRA11J00H series	Low dissipation current at OFF state (I <sub>qs</sub> : 1 μA (MAX.))	1	35	1.5	15	5, 9, 12	±2.5	0.5	○	○	○	○				B				
PQ3RD13J000H	ASO protection function		20			3.3			○	○	○				A					
PQxxRD11J00H series	ASO protection function		1.4			5, 9, 12			○	○	○			○	A					
PQxxxRDA1SZH series	ASO protection function, low dissipation current at OFF state (I <sub>qs</sub> : 5 μA (MAX.))	2	24	1.4	15	3.3, 5, 8, 9, 12	±3	1.0	○	○	○	○				A				
PQxxxRDA2SZH series			20			3.3, 5, 9, 12			±2.5	○	○	○	○			A				
PQxxxEF01SZH series	Minimum operating input voltage: 2.35 V (4 terminals)	1	10	1.4	15	1.5, 1.8, 2.5, 3.3	±2.5	0.5	○	○	○	○				A				
PQxxxEF02SZH series		2				○			○	○	○				A					
PQxxRF11J00H series	General purpose	1	35	1.5	18	5, 9, 12	±2.5	0.5	○	○	○		○			B				
PQxxRH11J00H series		1.5				○			○	○					B					
PQ3RD23J000H	ASO protection function	2	20	1.4	15	3.3	±3	0.5	○	○	○					A				
PQxxRD21J00H series						5, 9, 12			○	○	○					A				
PQxxRF21J00H series	General purpose	3.5	35	1.5	18	3.3	±2.5	0.5	○	○	○		○			B				
PQ3RF23J000H	General purpose					3.3			○	○	○				B					
PQ3RF33J000H	High output current	1	10	1.4	15	1.5 to 7	±2*4	0.5	○	○			○			A				
PQ070XF01SZH	Minimum operating input voltage: 2.35 V (4 terminals)					2			○	○					A					
PQ070XF02SZH	Minimum operating input voltage: 2.35 V (5 terminals)	1	17	1.25	12.5	1.5 to 15	±2*4	0.5	○	○	○	○	○	○		E				
PQ070VK01FZH	Minimum operating input voltage: 2.35 V (4 terminals)	2				○			○	○	○	○	○		E					
PQ070VK02FZH	Minimum operating input voltage: 2.35 V (5 terminals)	1	20	1.4	15	3.0 to 15	±2.5*4	1.0	○	○			○			A				
PQ15RW08J00H	ASO protection function, minimum operating input voltage: 3.5 V	1				1.25			10	3.0 to 15	○	○			○			A		
PQ15RW11J00H		2	1.4	15	○	○				A										
PQ15RW21J00H	ASO protection function	0.5	24	1.25	10	3.0 to 20	±2.5*4	1.0	○	○			○			A				
PQ150RWA2SZH	ASO protection function					1.5			15	○	○				C					
PQ20RX05J00H	Variable output voltage, output ON/OFF control	1	17	1.25	12.5	1.5 to 15	±2*4	0.5		○	○	○	○	○		E				
PQ20RX11J00H						ASO protection function			2	○	○	○	○	○		E				
PQ150VB01FZH	Overheat shutdown circuit, minimum operating input voltage: 2.35 V (5 terminals)	1	35	1.5	15	1.5 to 30	±2*4	0.5	○	○	△*6		○	○		B				
PQ150VB02FZH						ASO protection function			2	○	○	△*6		○	○		B			
PQ30RV11J00H	Variable output voltage	3	20	2	20	1.5 to 7	±2*4	0.5	○	○	△*6		○	○		B				
PQ30RV21J00H						ASO protection function			4.6	10	1.8	18	1.5 to 7	○	○	△*6		○		B
PQ30RV31J00H						ASO protection function								○	○	△*6		○		B
PQ7RV4J0000H	ASO protection function								○	○	△*6		○		B					

\*1 At self-cooling

\*2 With infinite heat sink attached

\*3 The xx/xxx in the model No. refer to the output voltage values of the model (e.g. 05/050 for 5 V, 12/120 for 12 V, 015 for 1.5 V).

\*4 Reference voltage precision

\*5 Current ratings are defined individually.

\*6 △ : Available by adding circuit

\*7 Refer to page 53

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### ● Low output current type [TO-92 type]

(Ta = 25°C)

Model No.	Features	Absolute maximum ratings			Electrical characteristics			Built-in functions		Package
		Output current I <sub>o</sub> (A)	Input voltage V <sub>in</sub> (V)	Power dissipation P <sub>d</sub> *1 (W)	Output voltage V <sub>o</sub> (V) TYP.	Output voltage precision (%)	Dropout voltage V <sub>i-o</sub> (V)	Overheat protection	Overcurrent protection	
PQ033ES1MXPQ ▲	Low output current type with general purpose TO-92 package (for auxiliary power supply)	0.15	16	0.52	3.3	±2	0.4 (I <sub>o</sub> = 150 mA)	○	○	TO-92
PQ050ES1MXPQ ▲					5					
PQ033ES3MXPQ ▲		0.3	9		3.3					
PQ050ES3MXPQ ▲					5					

\*1 At self-cooling

The model marked with ▲ may not be available in the near future. Contact with SHARP for details before use.

### ■ Surface Mount Type Low Power-Loss Voltage Regulators

#### ● SOT-23-5 type

(Ta = 25°C)

Model No.	Features	Absolute maximum ratings		Electrical characteristics			Built-in functions				Package	
		Input voltage V <sub>in</sub> (V)	Power dissipation P <sub>d</sub> *1 (W)	Output current I <sub>o</sub> (A)	Output voltage V <sub>o</sub> *2 (V) TYP.	Output voltage precision (%)	Dropout voltage V <sub>i-o</sub> (V)	Overheat protection	Overcurrent protection	ON/OFF control		Low dissipation current at OFF state
PQ1Uxx1M2ZPH series	Compact, low output current	16	0.35	0.18	1.8, 2.5, 2.8, 3.0, 3.3, 3.5, 5.0	±2.0 (3.0 V output)	0.26 (I <sub>o</sub> = 60 mA)	○	○	○	○	SOT-23-5
PQ1Xxx1M2ZPH series	Compact, ceramic capacitor compatible	9			*3			○	○	○	○	

\*1 When mounted on a board

\*2 The xx in the model No. refer to the output voltage values of the model (e.g. 50 for 5.0 V, 18 for 1.8 V).

\*3 1.5, 1.8, 2.5, 2.6, 2.7, 2.8, 2.9, 3.0, 3.3, 3.5, 3.7, 4.0, 4.5, 5.0

#### ● SOT-23L type

(Ta = 25°C)

Model No.	Features	Absolute maximum ratings			Electrical characteristics				Built-in functions				Package
		Output current I <sub>o</sub> (A)	Input voltage V <sub>in</sub> (V)	Power dissipation P <sub>d</sub> *1 (W)	Output current I <sub>o</sub> (A)	Output voltage V <sub>o</sub> *2 (V) TYP.	Output voltage precision (%)	Dropout voltage V <sub>i-o</sub> (V)	Overheat protection	Overcurrent protection	ON/OFF control	Low dissipation current at OFF state	
PQ1RxxJ0000H series	Compact, surface mount type, low dissipation current at OFF state (I <sub>qs</sub> : 0.1 μA (MAX.))	–	16	0.4	0.18	*3	±2.7 (3.0 V output)	0.26 (I <sub>o</sub> = 60 mA)	○	○	○	○	SOT-23L
PQ1Kxx3M2ZPH series	Compact, surface mount type, high ripple rejection, output current of up to 300 mA	0.3	9		–	1.8, 2.5, 3.0, 3.3, 3.6, 5.0	±2.0 (3.0 V output)	0.7 (I <sub>o</sub> = 300 mA)	○	○	○	○	

\*1 When mounted on a board

\*2 The xx in the model No. refer to the output voltage values of the model (e.g. 25 for 2.5 V, 47 for 4.7 V, 50 for 5.0 V).

\*3 1.8, 2.0, 2.3, 2.5, 2.7, 2.8, 2.9, 3.0, 3.2, 3.3, 3.4, 3.5, 3.7, 3.8, 4.0, 4.2, 4.4, 4.7, 4.9, 5.0, 5.2

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## ●SOT-89 type

(Ta = 25°C)

Model No.	Features	Absolute maximum ratings			Electrical characteristics			Built-in functions					Package
		Output current I <sub>o</sub> (A)	Input voltage V <sub>in</sub> (V)	Power dissipation P <sub>d</sub> *1 (W)	Output voltage V <sub>o</sub> *2 (V) TYP.	Output voltage precision (%)	Dropout voltage V <sub>i-o</sub> *3 (V)	Overheat protection	Overcurrent protection	ON/OFF control	Low dissipation current at OFF state	Variable output voltage	
PQ1Lxx3M2SPQ	Compact, high radiation package, low dissipation current at OFF state (I <sub>qs</sub> : 1 μA (MAX.))	0.3	16	0.9	1.5, 1.8, 2.5, 3.0, 3.2, 3.3, 5.0	±2.0 (3.0 V output)	0.7	○	○	○	○	SOT-89	
PQ1LAXx5MSPQ	Compact, high radiation package, ceramic capacitor compatible		15		1.2, 1.5, 1.8, 2.5, 3.3, 5.0	±2.0		○	○	○	○		
PQ1LAX95MSPQ	Ceramic capacitor compatible, variable output voltage	0.5	9		1.5 to 9.0	±2.0*6	○	○	○	○	○		
PQ1Mxx5M2SPQ	Compact, high output current, ceramic capacitor compatible			1.5, 1.8, 2.5, 3.3, 5.0	±2.0 (5.0 V output)	○	○	○	○				
PQ1MX55M2SPQ	Ceramic capacitor compatible, variable output voltage	0.35	9	1.3 to 5.0	±2.0*6	0.7	○	○	○	○	○		
PQ1Nxx3MxSPQ	Reset signal output function*4, ceramic capacitor compatible			2.5, 3.3	±2.0	○	○						
PQ2Lxxx2MSPQ	Compact, high radiation package, 2 outputs	0.25/ch	9	*5	–	0.4	○	○					

\*1 When mounted on a board

\*2 The xx in the model No. refer to the output voltage values of the model (e.g. 25 for 2.5 V, 50 for 5.0 V). [Except PQ2Lxxx2MSPQ]

\*3 Current ratings are defined individually.

\*4 Reset detection voltage: 4.2 V, 3.8 V

\*5 Output voltage combination: 3.3/3.3 V, 3.3/2.5 V, 3.3/1.8 V, 3.3/1.5 V, 2.5/1.8 V, 2.5/1.5 V

\*6 Reference voltage precision

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### ●SC-63 type (1) Output voltage fixed type

(Ta = 25°C)

Model No.	Features	Absolute maximum ratings			Electrical characteristics				Built-in functions						Package Package shape type <sup>6</sup>				
		Output current I <sub>o</sub> (A)			Input voltage V <sub>in</sub> (V)	Power dissipation P <sub>d</sub> <sup>*1</sup> (W)	Output voltage V <sub>o</sub> <sup>*2</sup> (V) TYP.	Output voltage precision (%)	Dropout voltage V <sub>i-o</sub> <sup>*5</sup> (V)	Overheat protection	Overcurrent protection	ON/OFF control	Low dissipation current at OFF state	Variable output voltage		Taped package			
		0.5	1	1.5															
PQ07VR5MAZPH series	Reset signal generation function (input voltage drop detection)	○			10		1.5 to 7	±2.0 <sup>*3</sup>	0.5	○	○			○	○	F			
PQ3DZ53J000H	ASO protection function, low dissipation current at OFF state (I <sub>qs</sub> : 5 μA (MAX.))	○			24		3.3	±3.0		○	○	○	○		○	○	F		
PQ3DZ13J000H											○	○	○	○		○	○	F	
PQxxDZ51J00H series		○								5, 9, 12		○	○	○	○		○	○	F
PQxxDZ11J00H series			○									○	○	○	○		○	○	F
PQxxxDNA1ZPH series	Ceramic capacitor compatible, ASO protection function, low dissipation current at OFF state (I <sub>qs</sub> : 5 μA (MAX.)), solder dip compatible lead shape			○			3.3, 5, 8, 9, 12	±2.5			○	○	○	○		○	G		
PQxxxDZ01ZPH series	Low dissipation current at OFF state (I <sub>qs</sub> : 5 μA (MAX.))			○	9, 10	5	3.3, 5	±3.0			○	○	○	○		○	F		
PQxxxEZ5MZPH series	Minimum operating input voltage: 2.35 V	○			10	8	1.5, 1.8, 2.5, 3.0, 3.3	±2.5 <sup>*4</sup>			○	○	○	○		○	F		
PQxxxEZ01ZPH series				○										○	○	○	○		○
PQxxxEN01ZPH series	Minimum operating input voltage: 2.35 V, solder dip compatible lead shape			○		8	1.5, 1.8, 2.5, 3.3	±2.0			○	○	○	○		○	G		
PQxxxENA1ZPH series				○								○	○	○	○		○	G	
PQxxxENB1ZPH series	Minimum operating input voltage: 2.35 V, ceramic capacitor compatible, solder dip compatible lead shape			○		5	1.2, 1.5, 1.8, 2.5, 3.3	±2.0	0.3	○	○	○	○		○	G			
PQxxxENAHZPH series				○			1.5, 1.8, 2.5, 3.3		0.9	○	○	○	○		○	G			
PQxxxEZ1HZPH series	Minimum operating input voltage: 2.35 V			○		8	1.5, 1.8, 2.5, 3.0, 3.3	±2.5 <sup>*4</sup>	1.0	○	○	○	○		○	F			
PQxxxEZ02ZPH series				○	(2 A)					1.5, 1.8, 2.5		0.5	○	○	○	○		○	F
PQxxxFZ5MZPH series	Minimum operating input voltage: 1.7 V (Dual power supply type)	○			3.7		1.0, 1.2			○	○	○	○		○	F			
PQxxxGN01ZPH series	Minimum operating input voltage: 1.7 V (Dual power supply type), ceramic capacitor compatible, solder dip compatible lead shape			○	5.5		0.8, 1.0, 1.2	±30 mV	–	○	○				○	G			
PQxxxGN1HZPH series				○							○	○				○	G		

\*1 With infinite heat sink attached  
 \*2 The xx/xxx in the model No. refer to the output voltage values of the model (e.g. 033 for 3.3 V, 05/050 for 5 V, 12/120 for 12 V).  
 \*3 Reference voltage precision  
 \*4 The value is defined as ±50 mV in some models.  
 \*5 Current ratings are defined individually.  
 \*6 Refer to page 53

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### ●SC-63 type (2) Output voltage variable type

(Ta = 25°C)

Model No.	Features	Absolute maximum ratings			Electrical characteristics				Built-in functions							Package Package shape type <sup>4</sup>																																								
		Output current I <sub>o</sub> (A)			Input voltage V <sub>in</sub> (V)	Power dissipation P <sub>d</sub> <sup>*1</sup> (W)	Output voltage V <sub>o</sub> (V) TYP.	Output voltage precision (%)	Dropout voltage V <sub>1-o</sub> <sup>*3</sup> (V)	Overheat protection	Overcurrent protection	ON/OFF control	Low dissipation current at OFF state	Variable output voltage	Taped package																																									
		0.5	1	1.5																																																				
PQ070XZ5MZPH	Minimum operating input voltage: 2.35 V	○			10	8	1.5 to 7	±2.0 <sup>*2</sup>	0.5	○	○	○	○	○	○	SC-63	F																																							
PQ070XZ01ZPH			○							○	○	○	○	○	○		○	F																																						
PQ070XN01ZPH	Minimum operating input voltage: 2.35 V, solder dip compatible lead shape		○							10	8	1.5 to 7	±2.0 <sup>*2</sup>	0.5	○		○	○	○	○	○	G																																		
PQ070XNA1ZPH			○												○		○	○	○	○	○	G																																		
PQ070XNAHZPH	Minimum operating input voltage: 2.35 V, ceramic capacitor compatible, solder dip compatible lead shape			○											10		8	1.5 to 7	±2.0 <sup>*2</sup>	0.9	○	○	○	○	○	○	G																													
PQ070XNA2ZPH				○ (2 A)																	10	8	1.5 to 7	±2.0 <sup>*2</sup>	0.5	○	○	○	○	○	○	G																								
PQ070XNB1ZPH			○																							10	8	1.5 to 7	±2.0 <sup>*2</sup>	0.3	○	○	○	○	○	○	G																			
PQ070XZ1HZPH	Minimum operating input voltage: 2.35 V			○																											10	8	1.5 to 7	±2.0 <sup>*2</sup>	1.0	○	○	○	○	○	○	F														
PQ070XZ02ZPH				○ (2 A)																																10	8	1.5 to 7	±2.0 <sup>*2</sup>	0.5	○	○	○	○	○	○	F									
PQ015YZ5MZPH	Reference voltage (V <sub>ref</sub> ): 1.0 V, minimum operating input voltage: 1.7 V (Dual power supply type)	○																																							10	8	1.0 to 1.5	±3.0 <sup>*2</sup>	-	○	○			○	○	F				
PQ035ZN01ZPH	Reference voltage (V <sub>ref</sub> ): 0.6 V, minimum operating input voltage: 1.7 V (Dual power supply type), ceramic capacitor compatible, solder dip compatible lead shape		○		10	8	0.8 to 3.5	±30 mV	-							○																														○			○	○	G					
PQ035ZN1HZPH				○												10																														8	0.8 to 3.5	±30 mV	-	○	○			○	○	G
PQ20VZ51J00H	Minimum operating input voltage: 4.5 V	○								10	8	1.5 to 20	±2.0 <sup>*2</sup>	-																																				○	○	○	○	○	○	F
PQ20VZ11J00H			○																																															10	8	1.5 to 20	±2.0 <sup>*2</sup>	-	○	○
PQ20WZ51J00H	Minimum operating input voltage: 3.5 V, ASO protection function, low dissipation current at OFF state (I <sub>qs</sub> : 5 μA (MAX.))	○													10		8	3.0 to 20	±2.5 <sup>*2</sup>	0.5																																			○	○
PQ20WZ11J00H			○																		10	8	3.0 to 20	±2.5 <sup>*2</sup>	0.5																														○	○
PQ200WNA1ZPH	Minimum operating input voltage: 3.5 V, ASO protection function, low dissipation current at OFF state (I <sub>qs</sub> : 5 μA (MAX.)), ceramic capacitor compatible, solder dip compatible lead shape		○																							10	8	3.0 to 20	±2.5 <sup>*2</sup>	0.5																									○	○
PQ200WN3MZPH		Minimum operating input voltage: 5.5 V, low dissipation current at OFF state (I <sub>qs</sub> : 5 μA (MAX.)), ceramic capacitor compatible, current limit: 800 mA	○ (0.3)																													10	8	5.0 to 20	±2.5 <sup>*2</sup>																				0.5	○

\*1 With infinite heat sink attached

\*2 Reference voltage precision

\*3 Current ratings are defined individually.

\*4 Refer to page 53

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### ●TO-263 type

(Ta = 25°C)

Model No.	Features	Absolute maximum ratings			Electrical characteristics			Built-in functions					Taped package	Package	
		Output current I <sub>o</sub> (A)	Input voltage V <sub>in</sub> (V)	Power dissipation P <sub>d</sub> *1 (W)	Output voltage V <sub>o</sub> *2 (V) TYP.	Output voltage precision (%)	Dropout voltage V <sub>i-o</sub> *4 (V)	Overheat protection	Overcurrent protection	ON/OFF control	Low dissipation current at OFF state	Variable output voltage			
PQxxxY053ZPH	High output current (minimum operating input voltage: 2.35 V)	5.0	7	35	1.5, 2.5, 3.3	±1.0	0.5	○	○	○			○	TO-263	
PQ05VY053ZPH					1.5 to 5	±1.0*3		○	○	○		○			
PQxxxY3H3ZPH		3.5			1.5, 2.5, 3.3	±1.0		○	○	○					
PQ05VY3H3ZPH					1.5 to 5	±1.0*3		○	○	○		○			
PQxxxEH02ZPH	2 A output (minimum operating input voltage: 2.35 V)	2.0	10		1.5, 1.8, 2.5	±2.5*5		○	○	○	○				○
PQ070XH02ZPH					1.5 to 7	±2.0*3		○	○	○	○	○	○		
PQ070XHA2ZPH	2 A output (minimum operating input voltage: 2.35 V), ceramic capacitor compatible				1.5 to 7	±2.0*3		○	○	○	○	○	○		○
PQxxxEH01ZPH	1 A output (minimum operating input voltage: 2.35 V)	1.0			1.5, 1.8, 2.5	±2.5*5		○	○	○	○				○
PQ070XH01ZPH			1.5 to 7	±2.0*3	○	○	○	○	○	○					

\*1 With infinite heat sink attached

\*2 The xxx in the model No. refer to the output voltage values of the model (e.g. 015 for 1.5 V, 025 for 2.5 V, 033 for 3.3 V).

\*3 Reference voltage precision

\*4 Current ratings are defined individually.

\*5 The value is defined as ±50 mV in some models.

### ●SOP-8 type

(Ta = 25°C)

Model No.	Features	Absolute maximum ratings			Electrical characteristics		Built-in functions			Taped package	Package
		Output current I <sub>o</sub> (A)	Input voltage V <sub>in</sub> (V)	Power dissipation P <sub>d</sub> *1 (W)	Output voltage V <sub>o</sub> (V) TYP.	Output voltage precision*2 (mV)	Overheat protection	Overcurrent protection			
PQ1DX095MZPQ	Built-in sink source function (For DDR II memory)	±0.8	6	0.6	V <sub>DD</sub> x 1/2 (V <sub>DDQ</sub> : 1.5 V (MIN.))	±25	○	○	○	SOP-8	
PQ1DX125MZPQ	Built-in sink source function (For DDR memory)				V <sub>DD</sub> x 1/2 (V <sub>DDQ</sub> : 2.3 V (MIN.))	±35	○	○	○		

\*1 When mounted on a board

\*2 Reference voltage precision

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## ■ Surface Mount Type Chopper Regulators (DC-DC Converters) (1)

(Ta = 25°C)

Model No.	Features	Absolute maximum ratings		Electrical characteristics					Package	
		Switching current I <sub>sw</sub> (A)	Power dissipation P <sub>d</sub> *1 (W)	Input voltage range V <sub>in</sub> (V)	Output voltage V <sub>o</sub> (V)	Output type	Oscillation frequency f <sub>o</sub> (Hz) TYP.	Output saturation voltage V <sub>sat</sub> (V) TYP.	Outline shape type*6	
PQ6CU12X2APQ	<ul style="list-style-type: none"> <li>High switching voltage: 40 V (MAX.)</li> <li>For tuner power supply</li> <li>Variable oscillation frequency</li> <li>Ceramic capacitor compatible</li> </ul>	0.25	0.35	3.0 to 5.5	up to 36	Step-up	300 k to 800 k	R <sub>on</sub> TYP. 1.7Ω	SOT-23-6W	
PQ1CN38M2ZPH	<ul style="list-style-type: none"> <li>PWM chopper regulator (high oscillation frequency)</li> <li>Output ON/OFF control function</li> <li>Overcurrent/overheat protection circuits</li> <li>For light load</li> </ul>	0.8	8	4.5 to 40	*3 V <sub>REF</sub> to 35 (step-down type)/ -V <sub>REF</sub> to -30 (inverting type)	Step-down	300 k	0.9	SC-63	G
PQ1CN41H2ZPH	<ul style="list-style-type: none"> <li>PWM chopper regulator (high oscillation frequency)</li> <li>Overcurrent/overheat protection circuits</li> </ul>	1.5	8			Step-down	300 k	0.9		G
PQ1CZ21H2ZPH	<ul style="list-style-type: none"> <li>PWM chopper regulator</li> <li>Output ON/OFF control function</li> <li>Overcurrent/overheat protection circuits</li> <li>Low dissipation current at OFF state (Standby current &lt;I<sub>SD</sub>&gt;: 1 μA (MAX.))</li> </ul>		8			Step-down	100 k	0.9		F
PQ1CX12H2ZPQ	<ul style="list-style-type: none"> <li>Bootstrap system for high efficiency (Efficiency 88% (TYP.))</li> <li>Low dissipation current</li> </ul>	2.5	0.9 When mounted on board	4.5 to 30	*3 V <sub>REF</sub> to 24	Step-down	150 k	0.25	SOP-8	
PQ1CX22H2ZPQ	<ul style="list-style-type: none"> <li>Bootstrap system for high efficiency (Efficiency 88% (TYP.))</li> <li>Low dissipation current</li> <li>Low voltage output: 1.2 V (MIN.)</li> </ul>							*4 V <sub>REF</sub> to 24 (step-down type)		
PQ1CX41H2ZPQ	<ul style="list-style-type: none"> <li>Bootstrap system for high efficiency (Efficiency 90% (TYP.))</li> <li>Low voltage output: 0.8 V (MIN.)</li> <li>Ceramic capacitor compatible</li> </ul>	1.5	0.8 When mounted on board	4.75 to 27	0.8 to 20	Step-down	400 k	R <sub>DSon</sub> TYP. 0.45Ω		
☆PQ1CX53H2ZPQ	<ul style="list-style-type: none"> <li>Bootstrap system for high efficiency (Efficiency 89% (TYP.))</li> <li>Low voltage output: 0.8 V (MIN.)</li> <li>Ceramic capacitor compatible</li> </ul>	3.5	2 When mounted on board	4.75 to 27	0.8 to 16	Step-down	400 k	R <sub>DSon</sub> TYP. 0.15Ω	USB-8	
☆PQ1CX61H1ZPQ	<ul style="list-style-type: none"> <li>Bootstrap system for high efficiency (Efficiency 88% (TYP.))</li> <li>Low voltage output: 1.0 V (MIN.)</li> <li>Ceramic capacitor compatible</li> </ul>	1.5	0.8 When mounted on board	4.75 to 28	1.0 to 18.9	Step-down	900 k	R <sub>DSon</sub> TYP. 0.55Ω	SOP-8	
PQ1CY1032ZPH	<ul style="list-style-type: none"> <li>PWM chopper regulator</li> <li>Output ON/OFF control function</li> <li>Overheat protection/overcurrent shutdown circuits</li> <li>High output current type</li> </ul>	3.5	35	4.5 to 40	*3 V <sub>REF</sub> to 35 (step-down type)/ -V <sub>REF</sub> to -30 (inverting type)	Step-down	150 k	1.4	TO-263	
PQ1CYxx3HZPH series PQ1CYxx3LZPH series*5	<ul style="list-style-type: none"> <li>PWM chopper regulator</li> <li>Fixed output voltage: 3.3 V or 5 V</li> <li>Overheat protection circuit</li> <li>Output ON/OFF control function</li> </ul>							35		

\*1 With infinite heat sink attached or when mounted on a board listed in the specification sheets.

\*2 Output variable range (step-down/inversion).

\*3 V<sub>REF</sub> nearly equal to 1.26 V\*4 V<sub>REF</sub> nearly equal to 1 V

\*5 PQ1CYxx3HZPH series is "H" active, and PQ1CYxx3LZPH series is "L" active.

\*6 Refer to page 53

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### ■Surface Mount Type Chopper Regulators (DC-DC Converters) (2)

Model No.	No. of output circuits	Input voltage range (V)	Output voltage (V)	System	Switching frequency (Hz)	Switching transistor	Switching current (mA) [Built-in SW Tr]	Drive capacity (pF) [External SW Tr]	Package
IR3M58M/U	3	4.5 to 28	External setting	Step-up (MAX. 20 V)/ step-down type PWM	70 k to 500 k	Built-in	400	1 000	P-QFP048-0707/ P-VQFN032-0505
				Step-down type PWM		External	–		
				Step-down, inverting type PWM		External	–		

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## ■ Chopper Regulators (DC-DC Converters)

### ● TO-220 type

(Ta = 25°C)

Model No.	Features	Absolute maximum ratings		Electrical characteristics					Package	
		Switching current I <sub>sw</sub> (A)	Power dissipation P <sub>d</sub> * <sup>1</sup> (W)	Input voltage range V <sub>in</sub> (V)	Output voltage V <sub>o</sub> * <sup>2</sup> (V)	Output type	Oscillation frequency f <sub>o</sub> (kHz) TYP.	Output saturation voltage V <sub>sat</sub> (V) TYP.	Outline shape type* <sup>5</sup>	
PQ1CG38M2FZH	<ul style="list-style-type: none"> <li>• PWM chopper regulator (high oscillation frequency)</li> <li>• Built-in overcurrent/overheat protection circuits</li> <li>• For light load</li> <li>• Output ON/OFF control function</li> </ul>	0.8* <sup>3</sup>					300	0.95	TO-220	E
PQ1CG38M2RZH										D
PQ1CG21H2FZH	<ul style="list-style-type: none"> <li>• PWM chopper regulator</li> <li>• Built-in overcurrent/overheat protection circuits</li> <li>• Output ON/OFF control function</li> </ul>	1.5* <sup>3</sup>					100	1.0	TO-220	E
PQ1CG21H2RZH										D
PQ1CG41H2FZH	<ul style="list-style-type: none"> <li>• PWM chopper regulator (high oscillation frequency)</li> <li>• Built-in overcurrent/overheat protection circuits</li> <li>• Output ON/OFF control function</li> </ul>	1.5* <sup>3</sup>	14	40	V <sub>REF</sub> * <sup>4</sup> to 35 (step-down type)/ -V <sub>REF</sub> * <sup>4</sup> to -30 (inverting type)	Step-down	300	1.0	TO-220	E
PQ1CG41H2RZH										D
PQ1CG2032FZH	<ul style="list-style-type: none"> <li>• PWM chopper regulator</li> <li>• Built-in overcurrent/overheat protection circuits</li> <li>• Output ON/OFF control function</li> </ul>	3.5* <sup>3</sup>					70	1.4	TO-220	E
PQ1CG2032RZH										D
PQ1CG3032FZH	<ul style="list-style-type: none"> <li>• PWM chopper regulator (high oscillation frequency)</li> <li>• Built-in overcurrent/overheat protection circuits</li> <li>• Output ON/OFF control function</li> </ul>	3.5* <sup>3</sup>					150	1.4	TO-220	E
PQ1CG3032RZH										D
PQ2CF1J0000H	<ul style="list-style-type: none"> <li>• PWM chopper regulator</li> <li>• Built-in overcurrent/overheat protection circuits</li> </ul>	2.5* <sup>3</sup>	15	35	4.5 to 35 (step-up type)	Step-up	50	0.6	TO-220	E

\*1 With infinite heat sink attached

\*2 Output voltage variable range

\*3 Peak current

\*4 V<sub>REF</sub> nearly equal to 1.26 V (TYP.)

\*5 Refer to page 53

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